

# **PERMIT FACT SHEET and STATEMENT OF BASIS**

Permit Type:  
**National Pollutant Discharge Elimination System (NPDES)**

Permit Number:  
**WA0040649**

Permittee:  
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**Pacific Memorial Institute**  
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**Richland, WA 99352**

Facility:  
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Permitting Authority:  
**Department of Ecology**  
**Southwest Regional Office**  
**P.O. Box 47775**  
**Olympia, WA 98504-7775**

## *SUMMARY*

The permitting authority has made a tentative decision to issue a new permit for a five-year term to the above-named permittee for the discharge to the Sequim Bay at Sequim, Washington, from a laboratory researching the fates and impacts of environmental contaminants. The tentative decision to issue the permit is based on a determination that two necessary conditions are fulfilled: (1) that the minimum treatment/control criteria established by the best professional judgement of the permit writer are achievable with the technologies and management practices in place or proposed and (2) that the discharge under these technology-based controls would not have a reasonable potential to cause or contribute to violations of any receiving water quality standards or the characteristic uses of the receiving water. The draft permit should accompany this fact sheet.

The purpose of this fact sheet is to present the facts and reasoning on the basis of which the tentative decision was made.

## *PUBLIC INVOLVEMENT OPPORTUNITY*

Interested persons are invited to comment on this tentative decision. Comments on the draft permit will be received for 30 days following the day of publication of the notice in the local newspaper, *The Peninsula Daily News*. (The target date for publication is \_\_\_\_\_).

All written comments submitted during the comment period will be retained by the permitting authority and considered in making the final decision on the application for a permit. The permitting authority will provide copies of the application, the tentative decision and the fact sheet on request. Persons who submit written comments will be notified of the final decision.

The applicant or anyone affected by or interested in the tentative decision may request a public hearing. The request must be filed within the 30-day comment period, and must indicate the interest of the party filing such a request and the reasons why a hearing is warranted. The permitting authority will hold a public hearing if it determines there is sufficient public interest.

Please submit written comments to the permitting authority at the address below, to the attention of Industrial Permit Coordinator:

Department of Ecology  
Southwest Regional Office  
P.O. Box 47775  
Olympia, Washington 98504-7775

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## *INTRODUCTION*

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. Further, state law requires that a permit must be issued unless the department finds that the discharge will pollute waters of the state in violation of the public policy declared in RCW 90.48.10. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet and statement of basis for the draft permit conditions. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050).

After the public comment period has closed, the Department will summarize the substantive comments and respond to each comment. The summary and response to comments will become part of the administrative record of the permit decision. Parties submitting comments will receive a copy of the Department's response.

## *PERMIT STATUS*

The current NPDES permit became effective May 28, 1998 and will expire June 30, 2002. Battelle reapplied for a permit in March 2001, well ahead of the reapplication deadline. Notification of acceptance of the application was mailed to the applicant on May 21, 2001.

## *SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT*

Discharge Monitoring Reports (DMRs) submitted to the Department and compliance evaluation inspections conducted by the Department indicate 100% compliance with conditions of the current permit. The facility last received an inspection on January 18, 2002.

## *THE ACTIVITY*

Battelle Marine Science Laboratory, located adjacent to Sequim Bay in the Strait of Juan de Fuca, is a privately-owned facility which conducts research and analysis services in the areas of transport, fate and effects of contaminants in the marine environment. The location takes advantage of the proximity to a relatively pristine marine environment for in-situ observations and for water supply for its research and analysis purposes. Chemical analyses and biological assessments are carried out on contaminated waters, sediments and soils. A major portion of the work at this laboratory is the evaluation of toxicity of

sediments through bioassays, using standard EPA protocols. (The EPA protocols themselves may be tested or developed here.) Flow-through and static bioassays are performed using native and imported species. Bioassays of marine water contamination using fish are also performed. Media which are the subject of analyses may originate from virtually anywhere in the world.

Water for the bioassays is taken from Sequim Bay and returned. Total discharge flow rate varies according to experimental activities. The maximum water intake rate is limited by pumping capacity to 350 gallons per minute. Water usage rates for research activities vary with projects that are underway but average about 120 gallons per minute of seawater and 11 gallons per minute of fresh water. Of this, 76% never comes into contact with the contaminated experimental media.

### *DISCHARGES*

The site currently has two permitted discharges numbered 007 and 008. (Outfalls 001, 002 and 003 are historical outfalls no longer in use; Outfalls 004, 005 and 006 are active outfalls, but which discharge only storm water which is unassociated with any industrial activity. They were unnecessarily included in former permits, prior to 1998.)

The discharge from Outfall 007 is returned excess raw and filtered seawater, not used in experiments and not exposed to biological or chemical contaminants. Some is used to supply flow-through holding tanks for indigenous plants and animals and some for non-contact temperature control of bioassay experiments. The discharge from Outfall 007 currently averages about 100 gallons per minute, about 76% of the total water usage.

The discharge from Outfall 008 could be maintained at up to 250 gpm but averages just 30 gpm. The discharge consists of raw and filtered sea water and some freshwater from an onsite well. Discharged water includes water used in the research and analysis activities and by facility mechanical systems and less than one gallon per minute (average) wastewater from the chemistry lab. Water used in research and analysis projects is exposed to the contaminants in the media (often sediment) being tested. The contaminated media which are the subject of the testing may originate from most anywhere. The nature of all research work that will be performed and contaminants which will be encountered during the five-year term of the permit cannot be entirely known or predicted in advance. Potential contaminants are characterized prior to each individual experiment, however, and sufficiency of the existing in-place controls and any need for supplemental controls are assessed at that time.

### *POLLUTION CONTROL*

#### *OUTFALL 007*

There are no pollution control measures associated with the “non-contact” wastewaters that discharge from Outfall #007.

#### *OUTFALL 008*

All project wastewaters pass through a central treatment system designed and built expressly for the kinds of pollutants anticipated to be encountered. This central treatment train begins with four separate below-ground storage or flow equalization tanks, where, due to the long detention time, sedimentation also

occurs. Other special treatment, such as initial disinfection of wastewaters potentially contaminated with pathogenic bacteria or virus, can be provided here. From these tanks, the wastewater is pumped through a series of unit operations: bag filtration, ozonation and activated carbon adsorption. This is a universal treatment system, intended to remove all types of contaminants, except soluble salts.

The operation of the final treatment system is essentially automatic. Gravity separation, filtration and adsorption are simple, passive, flow-through operations. Injection of ozone is increased and decreased automatically in response to changes in wastewater flow rate. Bag filters are inspected and backwashed weekly. Backwash solids are returned to the gravity separation units. Residuals from gravity separation are removed and then tested against hazardous waste designation criteria prior to disposal. (Little has designated as hazardous waste; disposal has been typically to an ordinary landfill). Every unit operation in the treatment train has redundancy.

This central system is the final step in the pollution abatement strategy. Control of pollutants in discharges from Outfall #008 starts, however, with the preparation for each research project of a project-specific, in-house discharge permit to identify pollution threats to the local environment and to establish appropriate control and sampling requirements. An import permit is obtained prior to receipt of any organisms or media from outside the U.S. Each project will then have its own pretreatment system specifically designed around the particular contaminants involved, with the goal of that pretreatment being to produce a discharge essentially free of those contaminants. (Examples of project-specific pretreatment have been chlorination to kill bacteria and fungi, autoclaving to kill exotic algae, activated carbon adsorption to remove chlorinated organic compounds.) There has been rare detection of anything in the effluent from any of the sediment testing.

System reliability measures include redundancy of all units, failure alarm systems, emergency power and automatic shutdown on failure. (In addition to dual ozone generators, a backup calcium hypochlorite disinfection system is ready for use). Several staff are trained to operate, maintain and troubleshoot the system. Someone is on call around the clock and there is a call list of at least four respondents. Security staff are trained to use this list when malfunctions are indicated after normal working hours.

## *DISCHARGE CHARACTERISTICS*

### **OUTFALL #007**

Table 1 is a summary of the information on the discharge from Outfall #007 as provided in the new permit application. The quality of the discharge from Outfall #007 is essentially identical to the quality of the receiving water. This is because it is merely the excess return flow from the water supply for the research projects, which is taken from the same body of water to which it is returned.

TABLE 1. Summary of Outfall #007 Monitoring

<b>ANALYTE / PROPERTY</b>	<b>RANGE</b>	<b>AVERAGE</b>	<b># SAMPLES</b>
BOD <sub>5</sub> , mg/L	<4	-	1
Total Suspended Solids, mg/L	12	-	1
Ammonia, mg/L	0.08	-	1
pH	8.0 - 8.0	-	2
Temperature, °C	7.7	-	1

Monitoring during an earlier permit term has shown that temperature can be elevated significantly in this circuit (perhaps as much as 4 °C in summer), but analysis of that data, for the previous permit decision,

indicated no reasonable potential for that increase to cause or contribute to receiving water quality standards violation beyond the allottable mixing zone.<sup>1</sup> (The requirement for temperature monitoring of this discharge was accordingly discontinued in the following permit.)

#### OUTFALL #008

Table 2 summarizes information provided by the applicant on the quality of the discharge from Outfall #008. The information comes from previous permit-required discharge monitoring and from the new permit application.

TABLE 2. Outfall #008 Discharge Characteristics

ANALYTE / PROPERTY	MAXIMUM	AVERAGE	# SAMPLES
BOD <sub>5</sub> , mg/L	<4	-	1
Total Suspended Solids, mg/L	<5	-	1
Ammonia, mg/L	<0.05	-	1
pH (range)	7.0 - 8.3	-	2
Temperature, °C	20.6	13.3	71,230
Nitrate, mg/L	5.1	3.3	4
Antimony, mg/L	0.02	0.0012	21
Arsenic, mg/L	0.006	0.0013	21
Beryllium		(believed absent)	
Cadmium, mg/L	0.00004	0.000002	21
Chromium, mg/L	0.0019	0.00009	21
Copper, mg/L	0.0001	0.000005	21
Lead		(believed absent)	
Mercury		(believed absent)	
Nickel, mg/L	0.0004	0.00002	21
Selenium, mg/L	0.04	0.002	21
Silver, mg/L	0.00004	0.00002	21
Thallium, mg/L	0.008	0.0012	21
Zinc, mg/l	0.041	0.0024	21
Bromoform, mg/L	0.0047	0.00065	42

Bromoform has been selected as a monitoring parameter for the previous permit (and is continued in this draft permit), not because its presence is routinely expected in the wastewater from the experiments, but because it is a product of the disinfection process: it is formed when seawater is exposed to ozone. (There is an irony worth mentioning here: This effect was not anticipated when the decision was made to use ozone instead of chlorine for disinfection, partly because of the tendency for chlorine to combine with organic molecules. The formation of bromoform was since discovered in the extensive effluent testing by Battelle environmental safety staff.) There has been no water quality criterion established for bromoform. There have been water quality criteria set for chloroform, a similar trihalomethane, based on human health risk. The applicable chloroform criterion (based on consumption of organisms from the receiving water) is 0.470 mg/L, 100 times higher than the highest measured bromoform concentration, and almost 1000 times higher than the more pertinent average concentration. Bromoform is not a water quality concern, then, but since it is always present in the disinfected wastewater (because it is formed in the process), it can be used advantageously as an indicator of the ongoing adsorption effectiveness and

<sup>1</sup> Fact Sheet for Battelle Marine Science Laboratory Draft NPDES Permit, Department of Ecology, February 1998

eventual exhaustion of the activated carbon units (which follow the ozone disinfection process where the bromoform is generated).

Bromoform has been measured monthly beginning in July 1998 by grab sampling upstream and downstream of the wastewater treatment system's activated carbon bed. Through December 2001, forty-two samples have been collected. These concentrations have been compared to the concentrations downstream of the bed, as an indicator of the removal efficiency of by the activated carbon. Bromoform was detected in all upstream samples and twenty-eight of the downstream samples. The ratio of upstream to downstream concentration ranged from a low of 16:1 to a high of 360:1. (In calculating this ratio, when there was no detection of bromoform, the concentration was assumed to be the method detection limit.) There is no apparent trend in removal efficiency indicated by this data. (Please refer to Exhibit 1).

In addition to routine monitoring for bromoform, the current permit requires the monitoring of discharges from Outfall #008 for specific chemicals associated with individual experiments. During the last three years the discharge was analyzed for 13 metals from the EPA "priority pollutant" list on 21 occasions; none were detected at concentrations near the receiving water standard. Twenty-six chlorinated pesticides and PCBs were analyzed on 21 occasions; none were detected at concentrations near receiving water quality criteria. Twenty-six chlorinated pesticides and PCPs were analyzed on 21 occasions; none were detected. Sixteen polynuclear aromatic hydrocarbons were analyzed on 19 occasions; none were detected. Fifty-nine base-neutral extractables were analyzed on a single occasion; none were detected. The discharge was analyzed for organo-tins eight times, petroleum hydrocarbons nine times, pentachlorophenol four times, glyphosphate twice; in no case were any detected. The discharge was analyzed for nitrate four times; the average concentration was 3.3 mg/L nitrate as N, with a maximum concentration of 5.1 mg/L.

#### THE RECEIVING WATER

The receiving water (Sequim Bay) at the point of discharge is designated as a "Class AA (extraordinary)" marine water body for the purposes of the application of state water quality standards. Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all designated uses. Characteristic and designated uses for Class AA waters include: salmonid and other fish migration, fish and shellfish rearing, spawning and harvesting, wildlife habitat, primary contact recreation, sport fishing, boating and aesthetic enjoyment, commerce and navigation. Distinctive narrative and numerical water quality criteria for this class are set out at WAC 173-201A-030(1)(c) and WAC 173-201A-040(3). Actual receiving water characteristics as measured during a previous permit term are summarized in Table 1.

TABLE 1. Summary of Receiving Water Monitoring (1996-1997)

ANALYTE / PROPERTY	RANGE	AVERAGE	# SAMPLES	LIMITS
pH	7.7 - 8.3	-	21	NA
Temperature, °C	7.3 - 12.1	9.7	21	NA
Turbidity, NTU	0.3 - 1.1	0.8	21	NA
TSS, mg/L	9 - 46	19	21	NA



## STATE AND NPDES PERMIT REQUIREMENTS APPLICABLE TO THIS DISCHARGE

State law (RCW 90.48.160) requires any person who conducts a commercial or industrial operation of any type which results in the disposal of solid or liquid waste material into waters of the state to procure a permit before disposing of such material.

The Revised Code of Washington declares it “to be the public policy of the State of Washington to maintain the highest possible standards to insure the purity of all waters of the state and to that end will require the use of all known available and reasonable treatment and other measures by industries and others to prevent and control the pollution of the waters of the state.” (RCW 90.48.010)

The Washington Administrative Code and the National Toxics Rule (WAC 173-201A and 40 CFR Part 131) establish water quality standards for state surface waters. Discharges of pollutants may not cause or contribute to violations of these standards.

The Clean Water Act makes the discharge of any pollutant to waters of the U.S. unlawful without a permit so authorizing (Section 301a). Title IV of the federal Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program. Every point source discharger must obtain a permit from EPA or an authorized state. EPA or a delegated state permitting authority may issue a permit to discharge pollutants (Section 402) upon condition that the discharge meets certain requirements. The permit must assure: (1) that the discharge meets any applicable and appropriate technology-based requirements (these can be numerical limitations based on demonstrated capability of available technology applications and/or “best management practices” to prevent and control discharges of pollutants) and (2) that it does not in any case cause or contribute to violations of the applicable receiving water standards.

### *TECHNOLOGY-BASED EFFLUENT LIMIT CONSIDERATIONS*

Effluent limits have been established by EPA for certain categories of industries but no such categorical, technology-based effluent limits are applicable to this discharge. For such discharges, effluent limitations reflecting minimum expected levels of treatment, prevention and control of pollutant discharges are left to the best professional judgement of the permit writer (40 CFR 125.3(c)(2)).

The current treatment system and other current methods of pollutant discharge prevention and control described above, under “Pollution Control Measures”, were deemed to meet “best-professional-judgement” minimum technology-based control requirements for the discharges from Outfalls #007 and #008 for the preceding permits. There is no apparent reason to find otherwise at this time.

### *WATER QUALITY-BASED EFFLUENT LIMITATIONS CONSIDERATIONS*

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Surface water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin wide total maximum daily loading study (TMDL).

## NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

Numerical water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

## NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

## NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

## MIXING ZONES

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

## CONSIDERATION OF LIMITS BASED ON NUMERIC WATER QUALITY CRITERIA

The discharges as characterized by the permit application and historical discharge data would themselves always meet the numeric water quality criteria for the receiving water, except for temperature and the allowable incremental change in pH due to a point source wastewater discharge. The water quality standards provide for allowable exceedence of numeric criteria within a certain limited distance from the discharge point, allowing some mixing with the receiving water to achieve compliance with the criteria. The pH and temperature criteria, though not based on toxicity, apply arbitrarily outside the same mixing zone which is allowable for aquatic life chronic toxicity criteria exceedence. The maximum allowable mixing distance is 200 feet or 25% of the width of the receiving water body. In this case, the minimum

width restriction governs and the radius of the allowable mixing zone is 160 feet as determined for the 1992-issued permit.

An evaluation of the potential for violation of the criteria for temperature and pH was made and presented in the fact sheet for the 1997 permit decision, based on the discharge data and receiving water data collected during the term of the previous (1992) permit. The discharge characteristics as described in the new permit application show that the determination in 1997 that there was no reasonable potential for the discharge to cause or contribute to violations of these water quality criteria is still applicable. (The discharge temperature and pH extremes are smaller). The 1997 determination as presented in the previous fact sheet is here repeated.

#### WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Toxic concentrations of many pollutants and their combinations cannot be practically measured by available quantifying methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

This wastewater is itself the effluent from biological toxicity testing. Aside from this redundancy, while periodic toxicity testing may be useful and instructive for fairly constant and predictable discharges, it would be impractical to establish a meaningful regimen of toxicity testing on this variable and unpredictable discharge. Instead, the pollutant discharge control measures are aimed at capturing the myriad **toxic** pollutants which may be encountered. As earlier described, individual project-specific and pollutant-specific treatment systems are applied which target the particular pollutants encountered in the particular project. Beyond this, a fail-safe, full-time treatment system (also described earlier) is installed to assure against pass-through of organic pollutants and pathogens in toxic or harmful amounts. The original 1992 permit and the 1997 permit were issued without a requirement for toxicity testing based on these considerations. Since 1992, in all the testing that has been performed, there has been no detection of any toxic pollutant in amount exceeding or even approaching a water quality standard. On these bases, no whole effluent toxicity testing requirements have been established in this draft permit.

#### SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

### *BASIS FOR MONITORING REQUIREMENTS*

The monitoring points, frequencies, and methods prescribed in Special Condition S1 are deemed as needed to provide representative monitoring to establish compliance with permit limits (regulatory basis: 40 CFR 122.41(j) and 122.48 (b) and WAC 173-220-210).

Monitoring (at a minimum frequency of once per month) of environmental contaminants known or reasonably expected to be present in significant amounts in the discharge from each separate experiment or project is required by the draft permit to assess the effectiveness of pollutant discharge control measures and compliance with the state surface water quality standards applicable to the receiving water.

Monitoring of bromoform concentrations upstream and downstream of the activated carbon unit is required in the draft permit as an indicator of exhaustion of the activated carbon in terms of adsorption. Bromoform is an organic compound, which is continuously and consistently generated as a product of the wastewater disinfection process, making it an ideal indicator of the adsorption effectiveness of the carbon columns.

### *BASIS FOR OTHER PERMIT CONDITIONS*

The requirements of the General Conditions and Special Condition S2 are based directly on state and federal law and regulations and have been standardized for all individual industrial NPDES permits issued by the Department. These permit requirements are, for the most part, contained in 40 CFR 122.41 and WAC 173-220-150. Others stem from 40 CFR paragraphs 122.21, 122.22, 122.42, 122.43, 122.44, 122.62, 122.63 and 122.64 and WAC 173-220 sections -120, 180, 190 and 200.

**Exhibit 1 Bromoform Removal by MSL Wastewater Treatment Plant Carbon Bed**

